

SM3 10.3: Graphing Tangent & Cotangent

Problems:

Identify the period and first asymptote on the positive side of the x-axis.

1) $y = 2 \tan x$

per: π , asym: $x = \frac{\pi}{2}$

5) $y = \tan(x) - 3$

per: π , asym: $x = \frac{\pi}{2}$

2) $f(x) = 3 \cot(x)$

per: π , asym: $x = \pi$

6) $h(x) = 1 - 4 \cot(x)$

per: π , asym: $x = \pi$

3) $f(x) = \tan\left(\frac{1}{2}x\right)$

per: $\frac{\pi}{1/2} = 2\pi$, asym: $x = \pi$

7) $g(x) = \tan\left(x - \frac{\pi}{3}\right)$

per: π , asym: $x = \frac{5\pi}{6}$

4) $y = \cot(2x)$

per: $\frac{\pi}{2}$, asym: $x = \frac{\pi}{2}$

8) $f(x) = \cot\left(4x + \frac{\pi}{2}\right)$

per: $\frac{\pi}{4}$, asym: $x = \frac{\pi}{8}$

Describe how changes in the given variable change the shape of the tangent curve:

$$y = a \tan(b(x - h)) + k$$

9) $k = 2$

shift up 2

13) $b = 2$

twice as many curves

10) $k = -\frac{1}{3}$

shift down $\frac{1}{3}$

14) $b = \frac{1}{3}$

 $\frac{1}{3}$ as many curves

11) $a = 2$

stretched it by 2

15) $h = \pi$

shift right by π

12) $a = \frac{1}{3}$

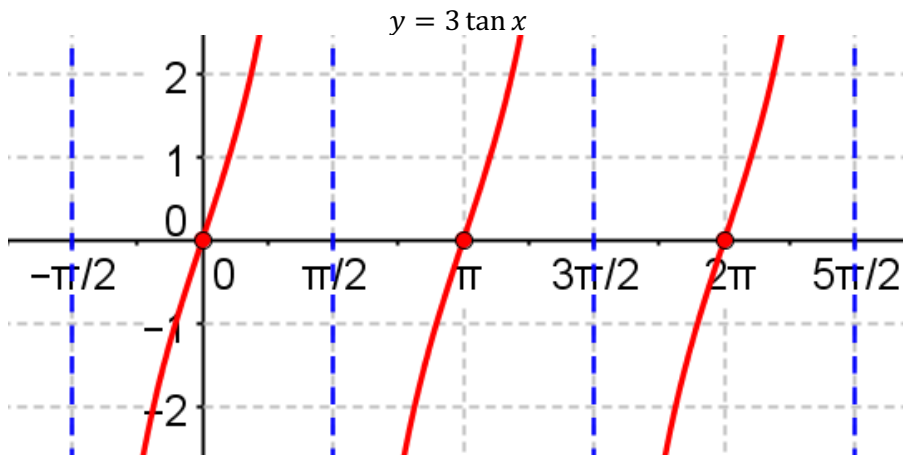
shrunk it by $\frac{1}{3}$

16) $h = -\frac{\pi}{4}$

shift left by $\frac{\pi}{4}$

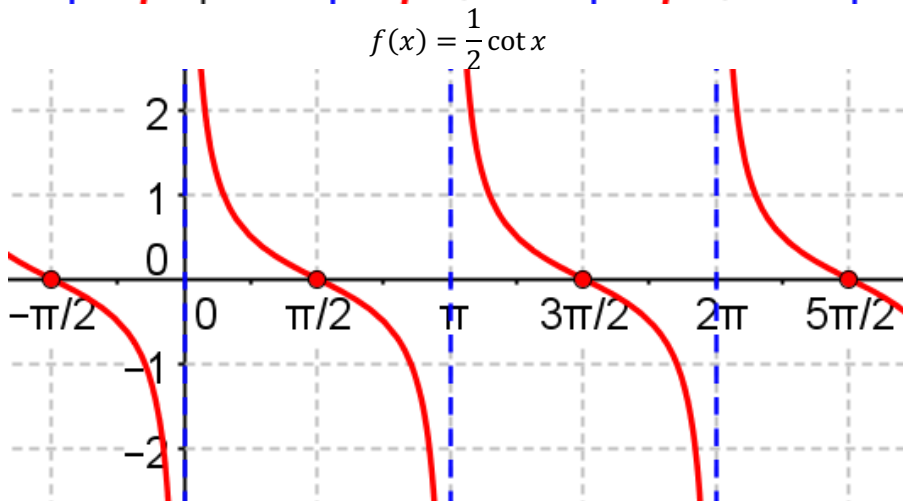
Sketch an appropriate coordinate axis and graph two periods of the function.

17)



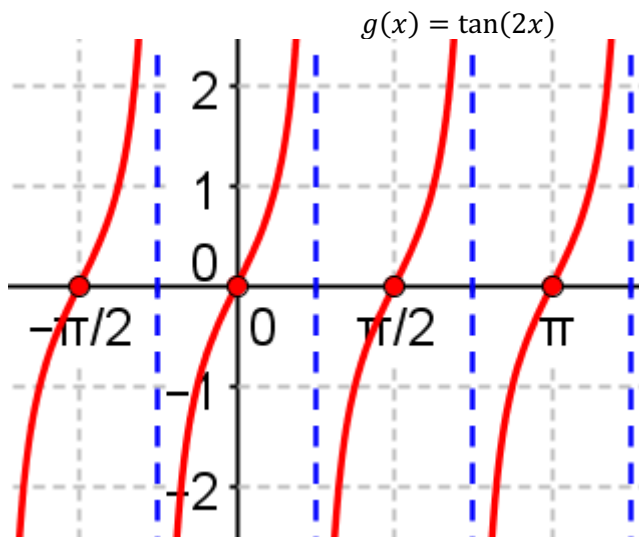
Per:	π
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{2}$

18)



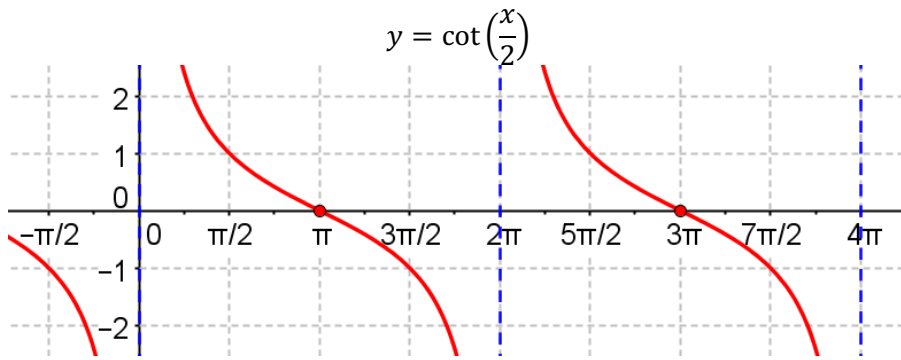
Per:	π
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{2}$

19)



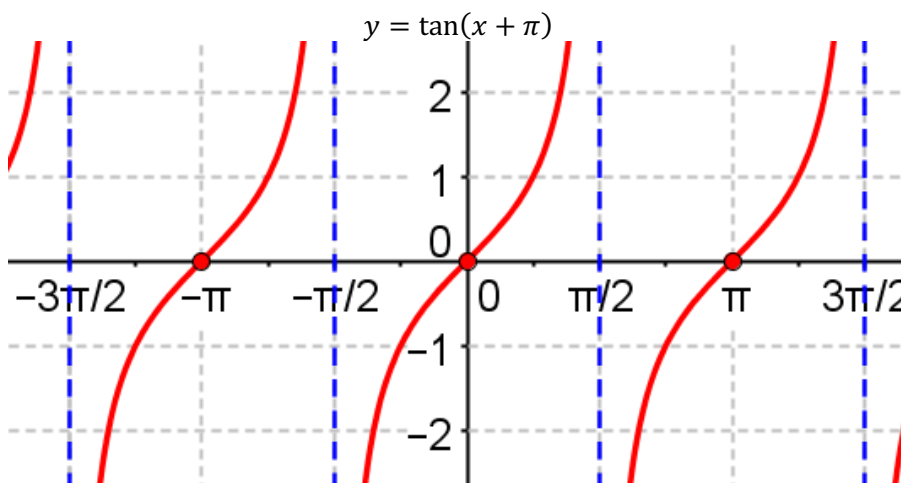
Per:	$\frac{\pi}{2}$
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{4}$

20)



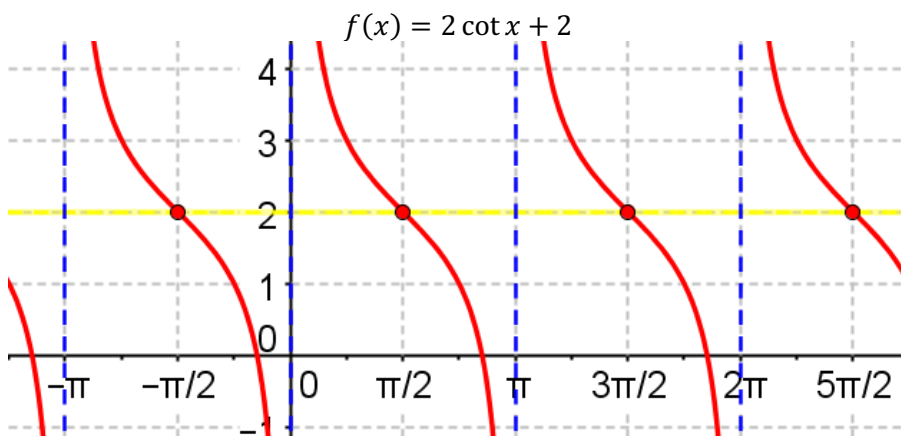
Per:	2π
P.S.:	0
V.S.:	0
Scale:	π

21)



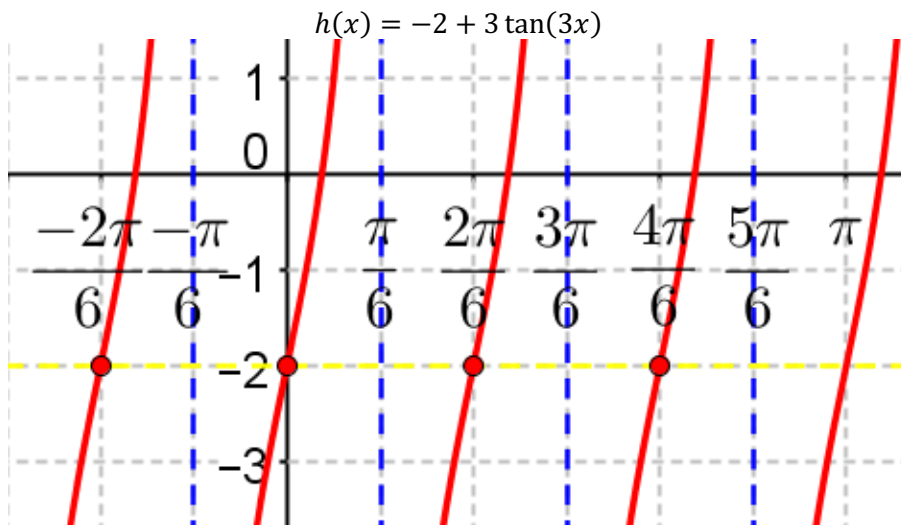
Per:	π
P.S.:	$\leftarrow \pi$
V.S.:	0
Scale:	$\frac{\pi}{2}$

22)



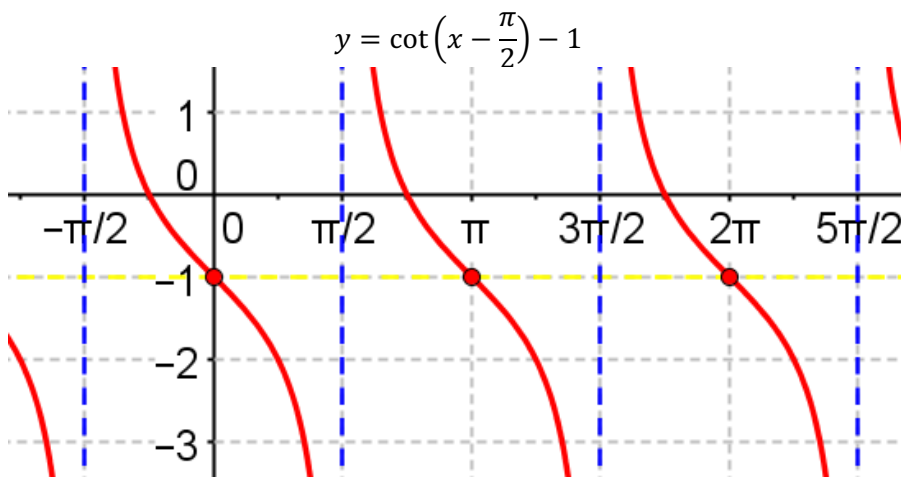
Per:	π
P.S.:	0
V.S.:	2
Scale:	$\frac{\pi}{2}$

23)



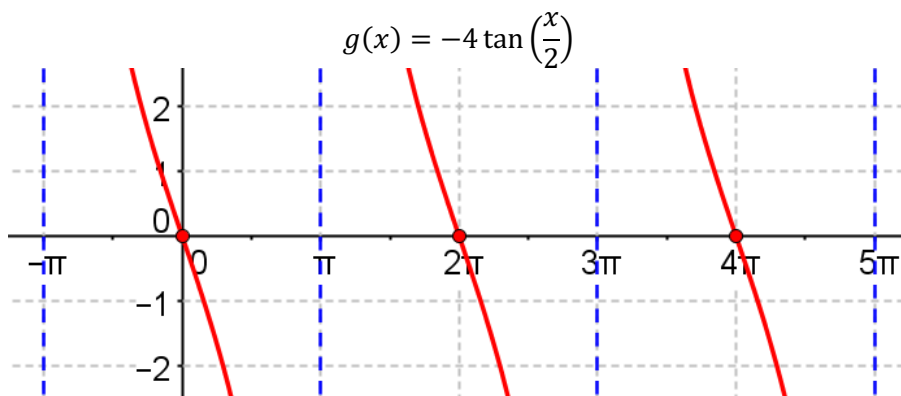
Per:	$\frac{\pi}{3}$
P.S.:	0
V.S.:	-2
Scale:	$\frac{\pi}{6}$

24)



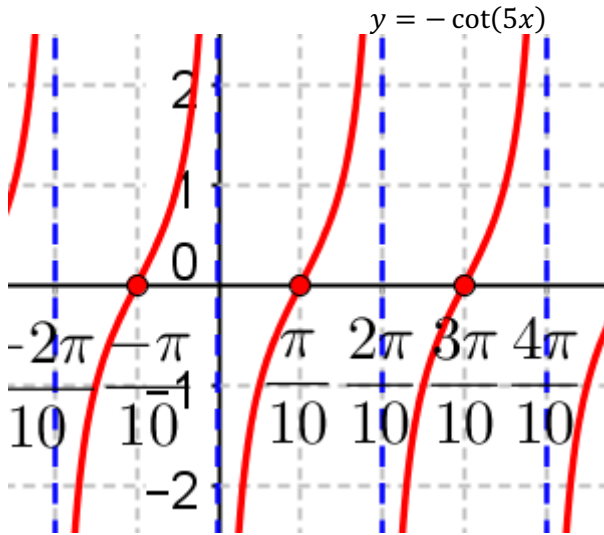
Per:	π
P.S.:	$\rightarrow \frac{\pi}{2}$
V.S.:	-1
Scale:	$\frac{\pi}{2}$

25)



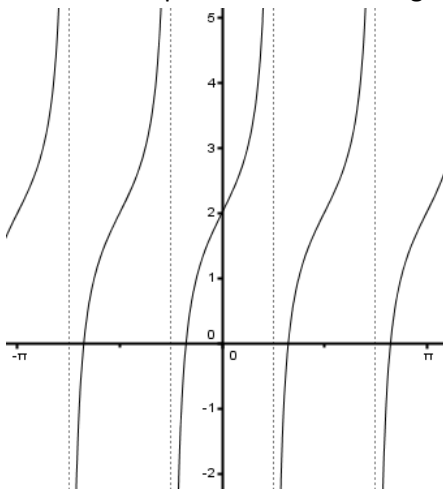
Per:	2π
P.S.:	0
V.S.:	0
Scale:	π

26)



Per:	$\frac{\pi}{5}$
P.S.:	0
V.S.:	0
Scale:	$\frac{\pi}{10}$

27) Write the simplest form of the tangent function for the given graph.



$$y = \tan(2x) + 2$$



A ferris wheel with 8 carriages has a radius of 40 feet. The wheel spins at a rate of 2.5 revolutions per minute. The bottom of the wheel has a clearance of 8 feet above the ground.

Monica and Shelly climb into a carriage at the bottom position using a retractable stair case.

28) Fill out the time and height values in the table, indicating how far the girls are from the ground t seconds after the ferris wheel begins moving (use t values that correspond to the carriage positions shown in the graphic):

Time (t):	0	3	6	9	12	15	18	21	24
Displacement:	8	$48 - 20\sqrt{2}$ 19.7	48	$48 + 20\sqrt{2}$ 76.3	88	$48 + 20\sqrt{2}$ 76.3	48	$48 - 20\sqrt{2}$ 19.7	8

29) What is the amplitude of the height on the ferris wheel (include units)?

$$40 \text{ ft}$$

30) As the wheel moves, it follows the points of a trigonometric curve. Which trigonometric function does the ferris wheel's displacement seem to follow: $\sin x$, $-\sin x$, $\cos x$, or $-\cos x$?

$$-\cos x$$

31) Use the formula $Period = \frac{2\pi}{b}$ to determine an appropriate value for (b):

$$b = \frac{\pi}{12}$$

32) How far is the wheel from the ground?

$$8 \text{ ft}$$

33) Write a trigonometric function that accurately describes the height of the wheel as a function of time:

$$H(t) = -40 \cos\left(\frac{\pi}{12}t\right) + 48$$